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Barley Field Diagnostic Information Release #12

The Importance of Crop Rotation

Released by the Soil and Crop Diagnostic Centre
In cooperation with the Market Analysis & Statistics Branch
Alberta Agriculture, Food and Rural Development
October 1, 1996

Crop rotation - Crop rotation is an important management practice that reduces the levels of insects, weeds, and many diseases and may help to improve soil conditions. Insect, disease, and nematode problems may be controlled by growing susceptible crops only once every two to five years. For best results, crop rotation should be combined with other management practices, such as elimination of crop residue, control of volunteers and weeds, and growing susceptible crops away from last year's stubble. The effectiveness of crop rotation is diminished when pathogens or insects are not host-specific, and therefore can infect or survive on other crops within the rotation. Crop rotation is also less effective when pathogens produce spores that are capable of long-term survival in the soil. In these two cases, disease problems may be reduced by crop rotation, but not eliminated.

There are two types of rotations, short-term and long-term, and each have their strengths and weaknesses. Short-term rotations (two or three years) allow producers to select crops in response to market conditions and with consideration for the herbicides used for weed control. The drawbacks of short-term rotations are that they usually do not improve soil conditions, and any long-lived soilborne pathogens may survive long enough to infect subsequent hosts. Long-term rotations, which may include perennial crops such as forage legumes and grasses, improve soil conditions and are better for breaking weed and pest cycles than shorter rotations. The disadvantages of long-term rotations are that they require careful advance planning and are not easily adapted to changing market conditions. Proper crop rotation is highly important for effective pest management, regardless of the tillage system employed, and it is especially critical in no-till or minimum tillage systems. Root and leaf diseases are most severe when both rotation and tillage are eliminated.

Tillage - Deep cultivation of stubble can be important for control of diseases, such as damping off and seedling blight, in the moister regions of the province (west central Alberta). Where moisture levels are high, foliar diseases can decrease yields by more than 25%, with subsequent declines in bushel weight and quality. In the spring, tillage increases heat absorption, warming the soil more quickly and increasing germination and seedling vigor, thereby reducing disease susceptibility. However, deep cultivation runs contrary to conservation tillage practices. Conservation tillage and its effects on barley disease incidence were discussed in Barley Field Diagnostic Information Release #2.

Disease, Insect, and Nematode Problems that are Improved by Proper Crop Rotations

Crop rotation helps control several barley diseases:

Anthracnose - avoid cereal-cereal rotations.

Bacterial blight

Common root rot/ seedling blight - rotate with noncereal crops, e.g. flax, canola, legumes, grasses.

Eyespot - rotate with non-cereal crops for at least two years.

Net blotch - crop rotation for at least two years, e.g. oats, flax, peas.

Powdery mildew

Scab/ fusarium head blight - at least a one year rotation, but avoid rotating with corn or wheat.

Scald - crop rotation for one to two years (except brome grass) and be sure to control barley volunteers in the interim.

Septoria leaf blotch - rotate with legumes, flax, canola, or fallow and avoid wheat, rye, oats, grasses.

Spot blotch - rotate with non-grass crops.

Take-all - rotate for one year with clean fallow or any crop but wheat, oats, rye, triticale, or susceptible grasses; there may also be some unreliability in control if rotating with legumes, such as alfalfa, beans, or soybeans.

Crop rotation also helps control some insects and nematodes that may be a problem on barley:

Brown wheat mites - the population buildup can be interrupted by a fallow year or rotation with an oilseed crop or legume forage.

Barley thrips

Grasshoppers - avoid seeding barley into grasshopper-infested stubble.

Pale western cutworm

Root-gall nematode - rotate with legumes and root crops.

If you have any questions or comments about this information, please contact Dee Ann Benard at: Soil and Crop Diagnostic Centre, Room 905, 6909-116 Street, Edmonton, AB, T6H 4P2; ph. (403) 427-6361 or contact your RITE operator (where available) at 310-0000 to be connected toll-free; fax (403) 427-1439; E-mail benard@agric.gov.ab.ca